Stoller
Hanford Office

DOE-EM/GJ679-2004

C4548
Log Data Report

Borehole Information:

Borehole: C4548			Site: 216-U-1 & -2 Cribs		
Coordinates (WA State Plane)		GWL (ft)[1]: Dry		GWL Date: 05/27/2004	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
Not Available	Not Available	May 2004	Not Available	60	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.0	6 5/8	5 1/2	9/16	0.0	60

Borehole Notes:

Zero reference is the ground surface. Fluor FTL was source of the casing data. This push hole is located south of the crib.

Logging Equipment Information:

Logging System:	Gamma 2A		Type: SGLS (35%) 34TP20893A
Calibration Date:	03/2004	Calibration Reference:	DOE-EM/GJ642-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 / Repeat			
Date	06/01/04	06/01/04			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	59.60	59.60			
Finish Depth (ft)	0.0	52.0			
Count Time (sec)	200	400			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A[3]	N/A			
Pre-Verification	BA345CAB	BA345CAB			
Start File	BA345000	BA345061			
Finish File	BA345060	BA345069			
Post-Verification	BA345CAA	BA345CAA			
Depth Return Error (in.)	0.0	0.0			

Log Run	1	2 / Repeat			
Comments	No gain adjustments.	Repeat Section. Adjusted gain after file BA345062.			

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier. The first spectrum (BA345000) was collected at the bottom of the borehole. The tool reached total depth at 59.60 ft. A 400-s real time count time was used for the repeat section to investigate possible zone of $^{235/238}$U.

Analysis Notes:

Analyst:	Sobczyk	Date:	6/2/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum, as compared to the pre-run verification spectrum, for the day were between 2.3 percent lower and 8.8 percent lower at the end of the day. The peak counts per second at 2615 keV showed the greatest variation of the KUT photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The pre-run verification spectrum was used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AMar04.xls). Zero reference was the ground surface. The casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 59.60 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{238}U were the man-made radionuclides detected in this borehole. ^{137}Cs was detected near the ground surface in the interval between 0 and 3 ft at concentrations ranging from 0.3 pCi/g to 1.1 pCi/g. The maximum concentration of ^{137}Cs was measured at the surface. ^{238}U, based on the 1001-keV photopeak, was detected at 52 and 53 ft with concentrations of 27 and 42 pCi/g, respectively. The MDL for ^{238}U was approximately 15 pCi/g. Photopeaks at 186 keV were apparent at 53 and 54 ft, and a photopeak at 100 keV

was apparent at 54 ft. However, the APTEC software did not identify these photopeaks as being statistically significant. Calculations to determine ^{235}U concentrations are based on the 186-keV photopeak.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV and for ^{238}U at 1001 keV. It is interesting to note that the 1001-keV photopeak at 54 ft on the original log run (200-s counting time) did not repeat on the repeat run in spite of the longer counting time of 400 s.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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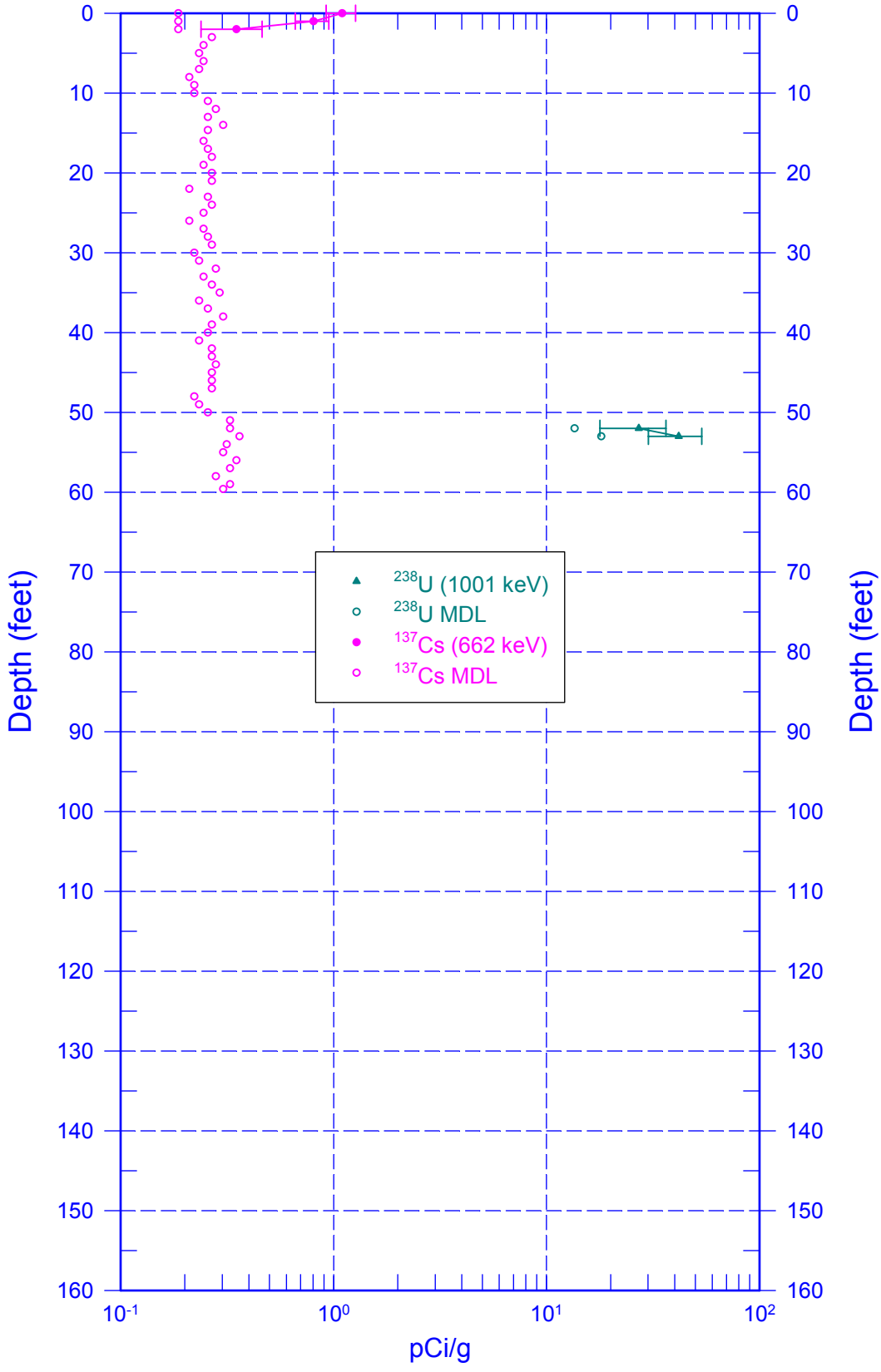
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
6/1/2004

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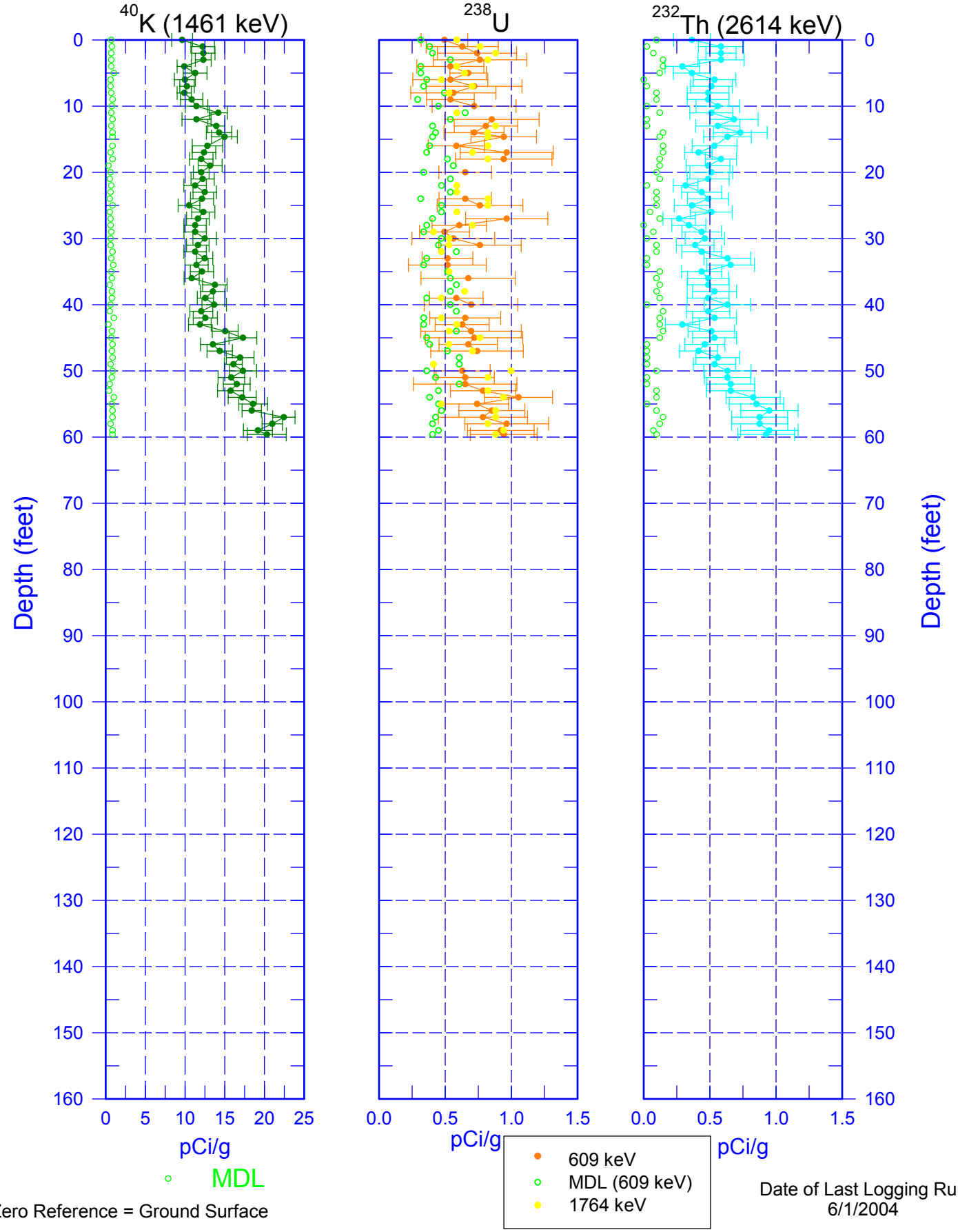
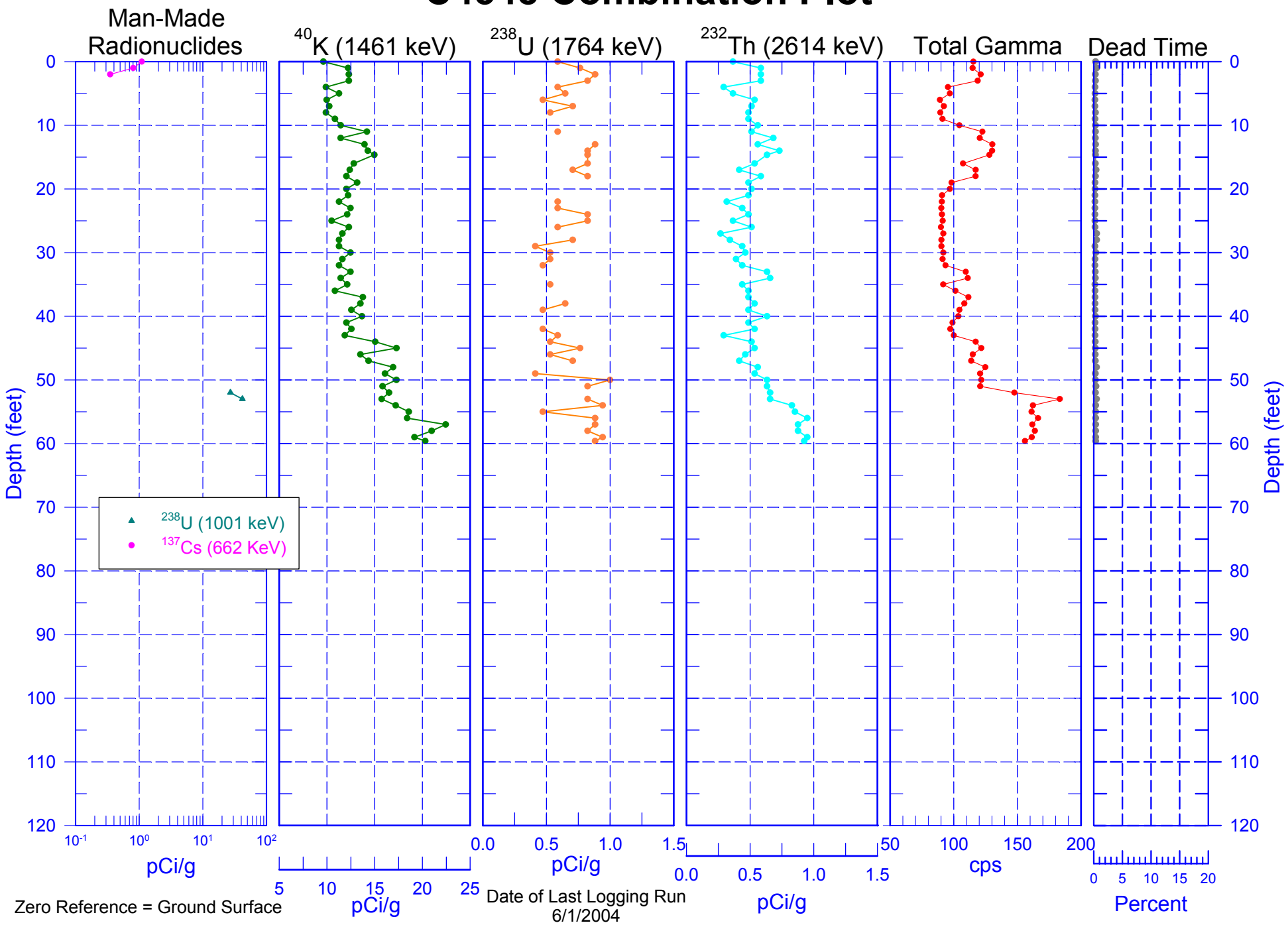
Natural Gamma Logs



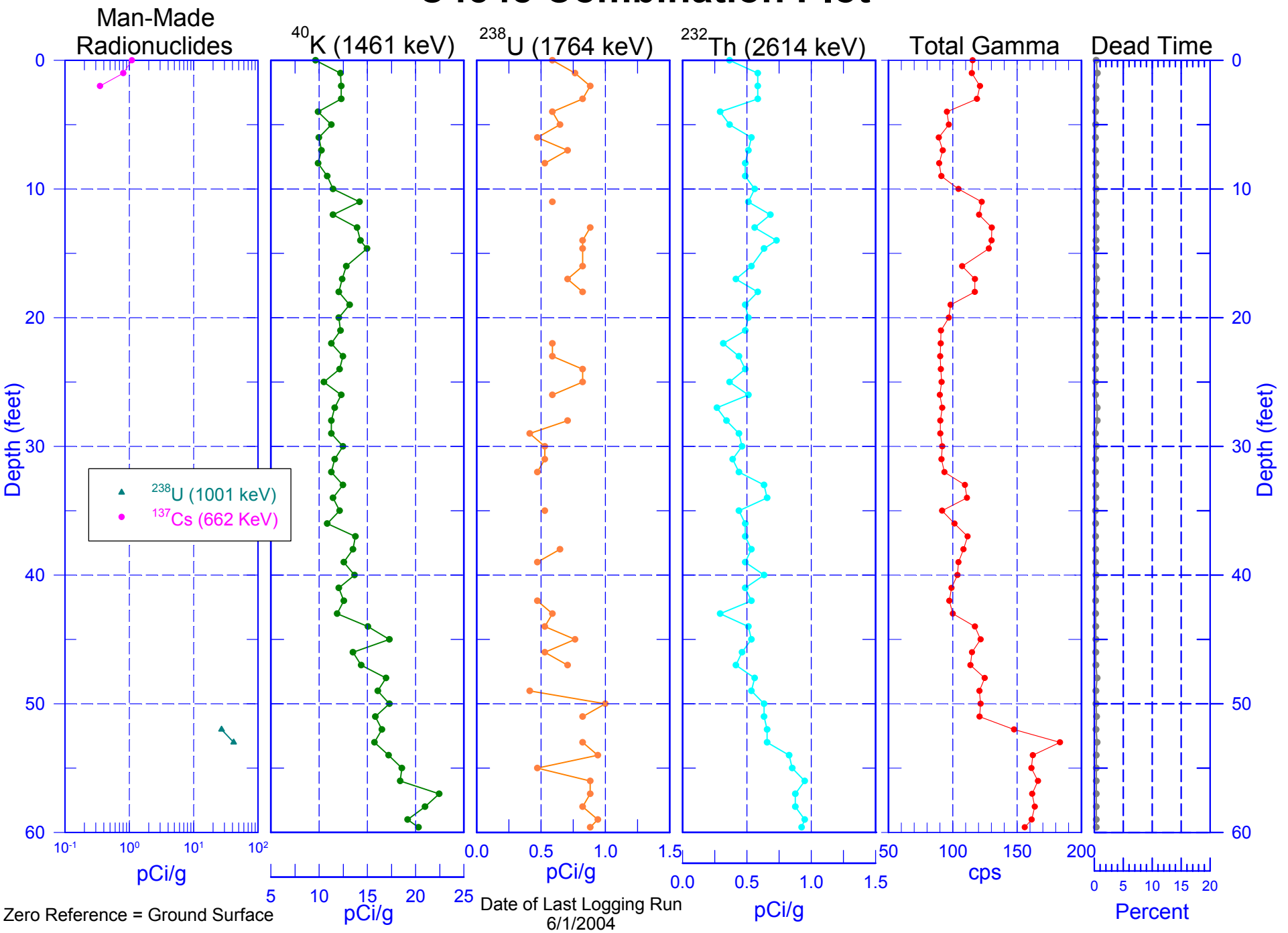
Zero Reference = Ground Surface

Date of Last Logging Run
6/1/2004

C4548 Combination Plot



C4548 Combination Plot



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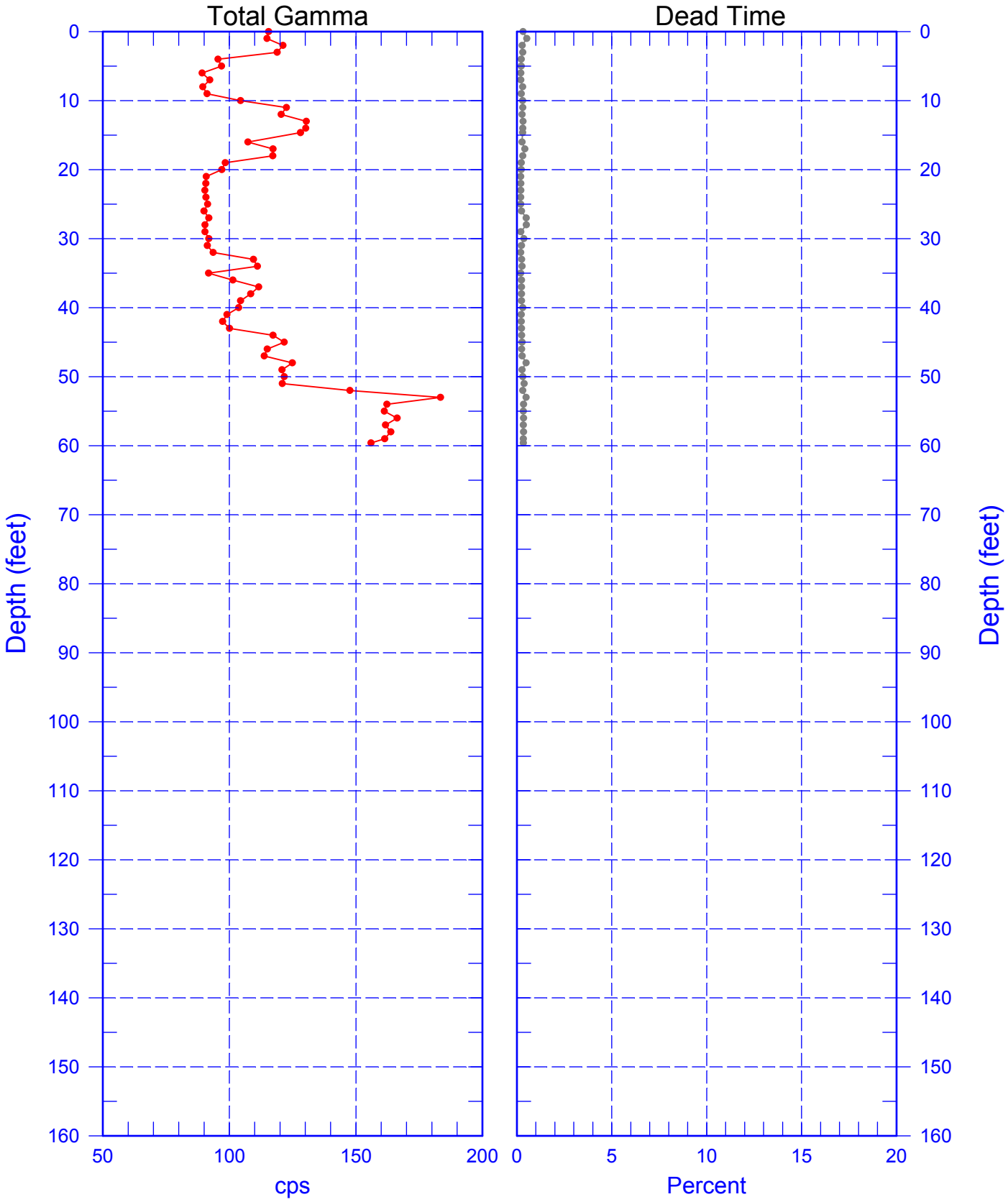
Total Gamma & Dead Time



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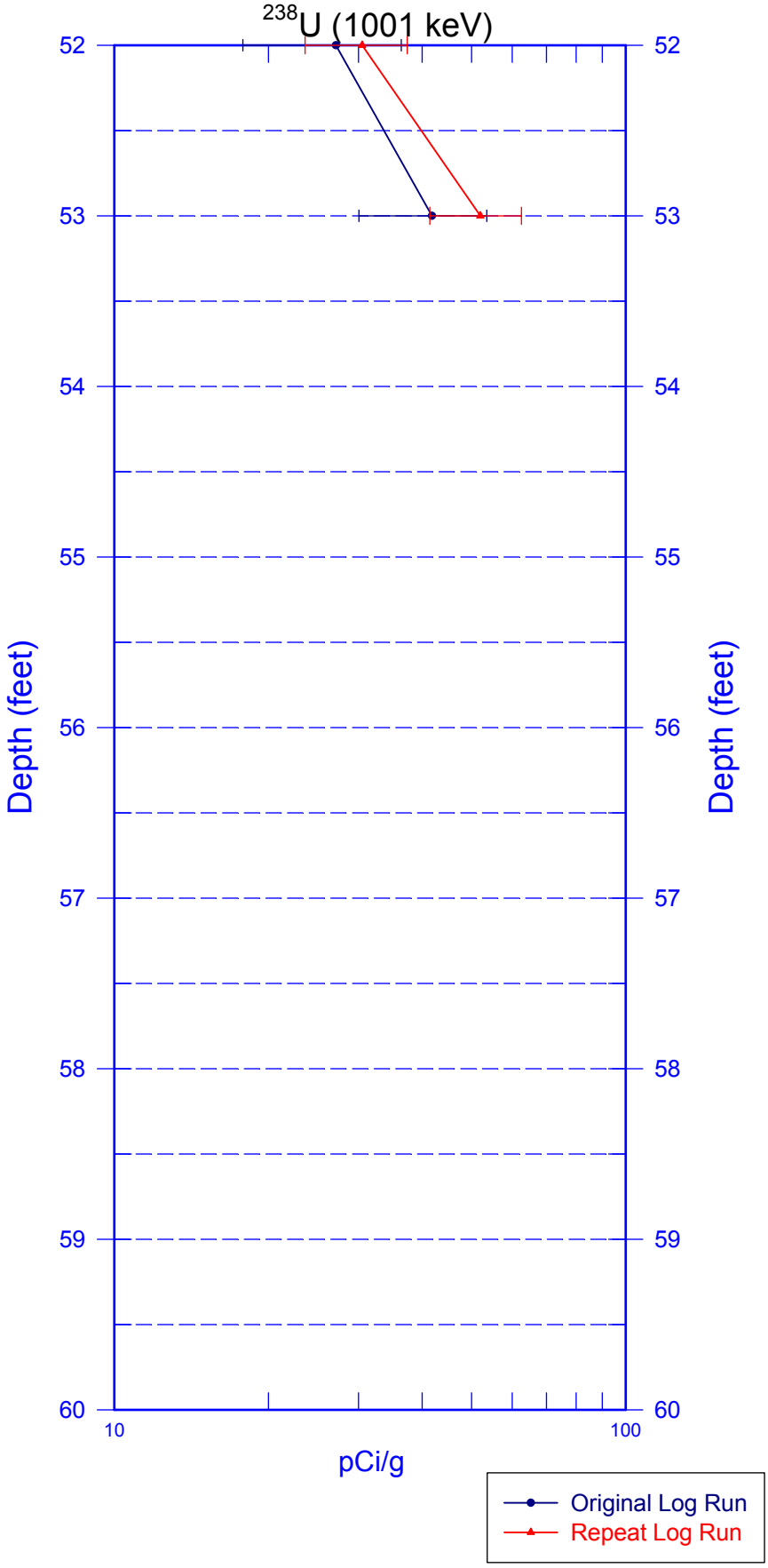
Rerun of Man-Made Radionuclides



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Rerun of Natural Gamma Logs (59.6 to 52.0 ft)